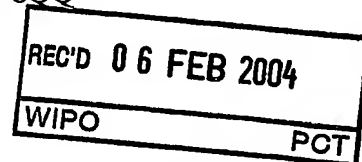




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The Patent Office
Concept House
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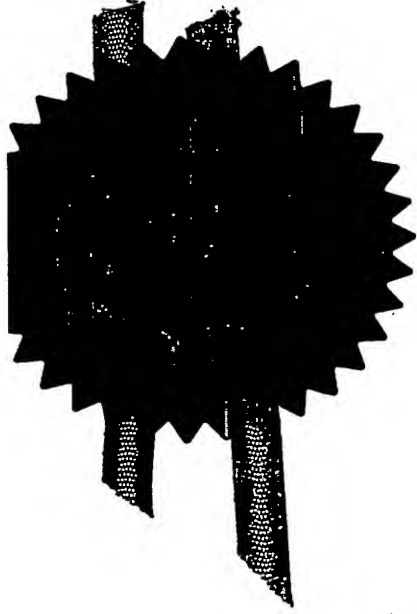
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GB0207382.3

By virtue of a direction given under Section 30 of the Patents Act 1977, the application is proceeding in the name of

TECHNIKON LIMITED,
Blue Coats House,
Blue Coats Avenue,
HERTFORD,
Hertfordshire,
SG1H 1PB,
United Kingdom

Incorporated in the United Kingdom

[ADP No. 08250722002]

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28 MAR 2002

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Gwent NP9 1RH**Request for grant of a patent***(See the notes on the back of this form. You can also get an explanatory leaflet from the Patent Office to help you fill in this form.)***1. Your reference**

2025

2. Patent application number*(The Patent Office will fill in the number)*

0207382.3

28 MAR 2002

3. Full name of the or of
*(in all surnames)*Hollands Heating UK Ltd
United Technologies House
Guildford Road
LeatherheadPatents ADP number *(if you know it)*Surrey KT22 9UT
GB

If the applicant is a corporate body, give the country/state of its incorporation

GB

8353039001

4. Title of the invention

Computer Cabinet

5. Name of your agent (if you have one)

NIGEL BROOKS CPA

*"Address for service" in the United Kingdom to which all correspondence should be sent (including the postcode)*HILL HAMPTON
EAST MEON
PETERSFIELD
HAMPSHIRE GU32 1QNPatents ADP number *(if you know it)*

463001

6. If you are declaring priority from one or more earlier patent applications, give the country and the date of filing of the or of each of these earlier applications and (if you know it) the or each application number

Country	Priority application number <i>(if you know it)</i>	Date of filing <i>(day / month / year)</i>
GB	NA	NA

7. If this application is divided or otherwise derived from an earlier UK application, give the number and the filing date of the earlier application

Number of earlier application	Date of filing <i>(day / month / year)</i>

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- a) any applicant named in part 3 is not an inventor, or
 - b) there is an inventor who is not named as an applicant, or
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yes

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11. I/We request the grant of a patent on the basis of this application.

Signature

Date

28/03/02

12. Name and daytime telephone number of person to contact in the United Kingdom

NIGEL BROOKS CPA (01730) 823647

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COMPUTER CABINET

The present invention relates to a computer cabinet particularly, though not exclusively, for a plurality of internet server computers.

5

Increasing popularity of the internet has required the installation of more and more servers. Typically these are installed in locations of high density of use, namely areas where space for their installation is expensive.

10

It is known to mount computers in racking in a cabinet. Further, it is known to circulate cool air to the cabinet and withdraw the air heated by the computers from the cabinet.

15

Apart from the need for considerable quantities of such cool air, with attendant expense and space for ducting the air from a refrigeration unit; such an arrangement requires for the refrigeration unit to produce clean, dry air. If damp air is supplied to the servers or at least their racking and/or cases, there is a risk of condensation damaging them. Further, dust in the servers can cause difficulties such as their individual fans becoming less effective and them overheating.

20

The object of the present invention is to provide an improved computer cabinet.

25

Please note that as used herein, the term "computer" includes a computer dedicated for server use, i.e. a computer otherwise known as a server.

According to the invention there is provided a computer cabinet comprising:

- a cabinet as such;
- racking in the cabinet for a plurality of computers;
- 30 • a cooling heat-exchanger in the cabinet, the heat-exchanger being connectable to a supply of cooled fluid from outside the cabinet;
- at least one fan in the cabinet,

the cabinet being closed and the fan(s) being arranged to pass air over the heat-exchanger, over the computers and back to the heat-exchangers without passing it outside the cabinet.

5 Preferably the cabinet has air flow direction means for directing air to the computers and from them through the heat-exchanger, without by-passing the latter. Conveniently this is a dividing wall dividing a portion of the cabinet having the racking for the computers from a portion having the heat-exchanger and the fan(s).

10 Preferably the racking for the computers is oriented so that all the computers are cooled with air of a similar temperature, that is to say that the racking provides for the cooled air to impinge on the computers from one end of the racks.

15 Preferably the cabinet is thermally insulated to avoid heat gain from the ambient atmosphere warming the cool air circulated to the computers.

To help understanding of the invention, a specific embodiment thereof will now be described by way of example and with reference to the accompanying drawings, in which:

20 Figure 1 is a perspective view of a computer cabinet according to the invention;

Figure 2 is an end view showing the computers in the cabinet and their cooling fans;

25 Figure 3 is a cross-sectional side view on the line III-III in Figure 2 of the fans and a heat exchanger; and

Figure 4 is a cross-sectional plan view on the line IV-IV in Figure 2.

Referring to the drawings, a cooled computer cabinet 1 comprises a framework 2 and outer panels 3. These are of steel lined with insulating material.
30 The framework supports racking 4 for a series of server computers C, 42 typically in number. The cabinet has doors 5 giving access to each end of the racking, i.e. to each end of each individual server computer. The computers are arranged generally horizontally one above the other, with small gaps between them. The doors, whilst not being hermetic, are substantially air-tight. One side of the racking is adjacent one

side 6 of the cabinet between the doors 5. Up the other side of the racking there extends a partition 7. This extends between the top 8 and bottom 9 of the cabinet, but stops short of the doors, leaving airflow gaps 10, 11 between itself and the respective doors. The latter extend for the full height of the cabinet.

5

Installed between the partition and the opposite side 12 of the cabinet are plurality of fans 14 and a heat-exchanger 15. The fans are arranged one above the other for drawing air from the opposite gap 10, through the heat exchanger, back through the gap 11 and to all of the computers C. The arrangement is such that the air
10 is cooled by the heat-exchanger and distributed with an even temperature and flow rate to the computers. In other words all the computers experience substantially the same degree of cooling.

The heat-exchanger itself is cooled by cold water being flowed through it from
15 a refrigeration unit — not shown. It is provided with a thermostatic control valve 16, whereby the temperature in the cabinet is able to be kept constant. It is expected that the computers will dissipate up to 0.5kW each. The man skilled in the art will know the size of heat exchanger and capacity of the fans required for absorbing this amount of heat, bearing in mind that the average temperature of the computers should be
20 controlled to be around 15°C. The size of a typical cabinet will 1.0m long, 0.8m wide, 2.1m high, to accommodate 42 computers and five fans.

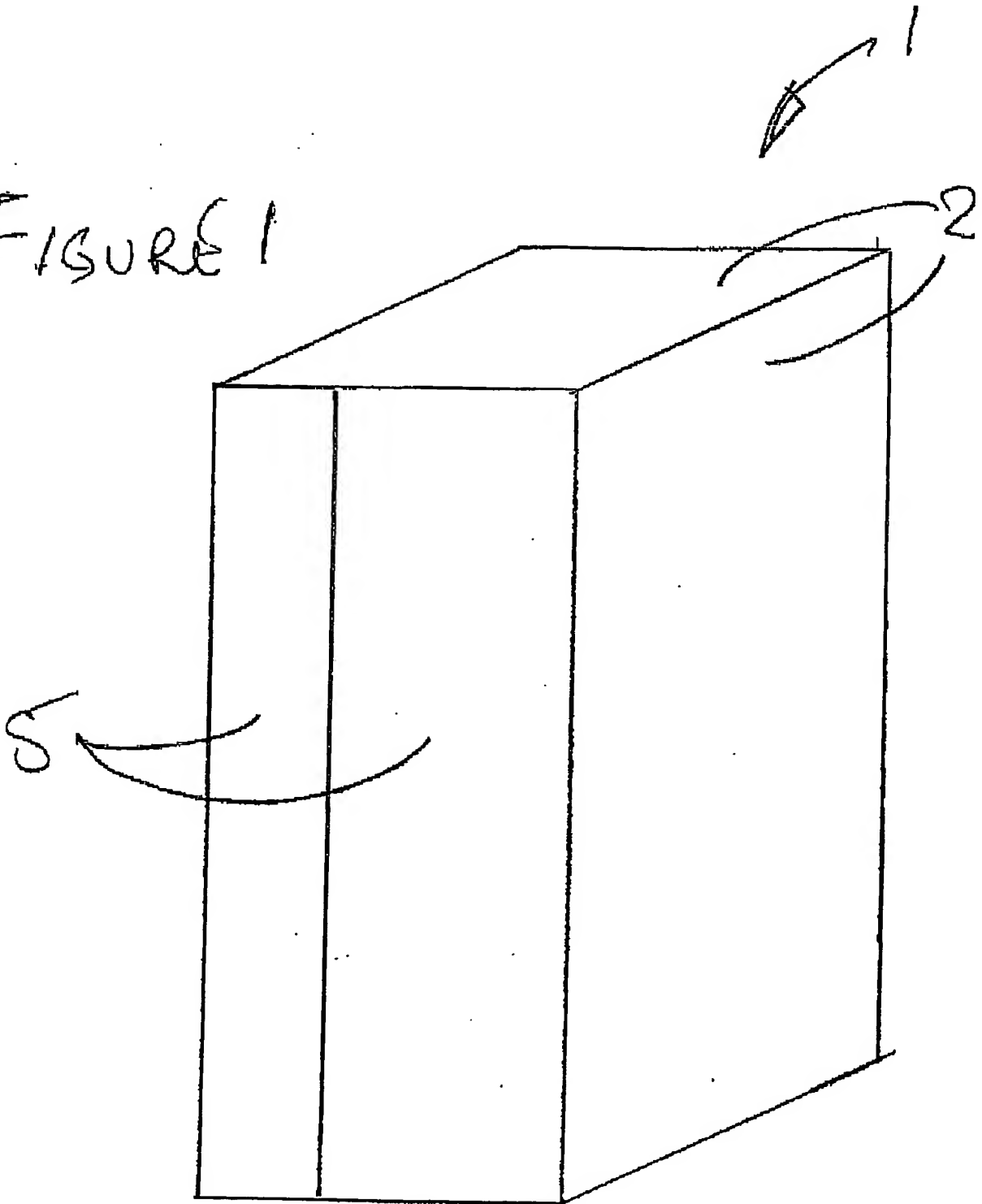
For use, the computers are installed, bus cabling being provided in known manner. As they are run up, the cabinet begins to heat up and the cooling flow to the
25 heat exchanger is switched on and the fans started. During this process, the doors or at least one can remain open for observation that all is operating correctly. The doors at the fan end should be closed first, since the computers will be cooled when ambient air is being drawn in through the open doors. However, since the heat dissipation from the computers is such that the air blown past them will normally be heated
30 substantially above ambient, calling for substantially more cooling than when ambient air is being drawn in, the cabinet ought to be closed before all the computers are operating normally to allow the thermostatic control of the cooling system to establish an even temperature as the computers are run up. It should be noted that as regards the cooling airflow within the cabinet, it is a closed system. For this reason, there is

no need of a dehumidifier within the cabinet. It is simply a matter of ensuring that the initial air within the cabinet is of sufficiently low humidity that no condensation occurs.

- 5 When maintenance is required without shutting down the computers, perhaps involving replacement of a faulty one of them, again the cooling system must continue to operate. To enable this to be done, the ambient temperature is preferably controlled before the doors are opened. If the fan end doors are opened, the ambient temperature should be brought down to that of the cooled air entering the racking. If
- 10 the heat-exchanger end doors are opened, the ambient temperature should be brought up to that of the air flow from the computers. Such control of the ambient temperature can be achieved by temporary attachment of an enclosure 21 to the cabinet, to provide lockout chamber, from which the maintenance can be effected.

1/3

FIGURE 1



2/3

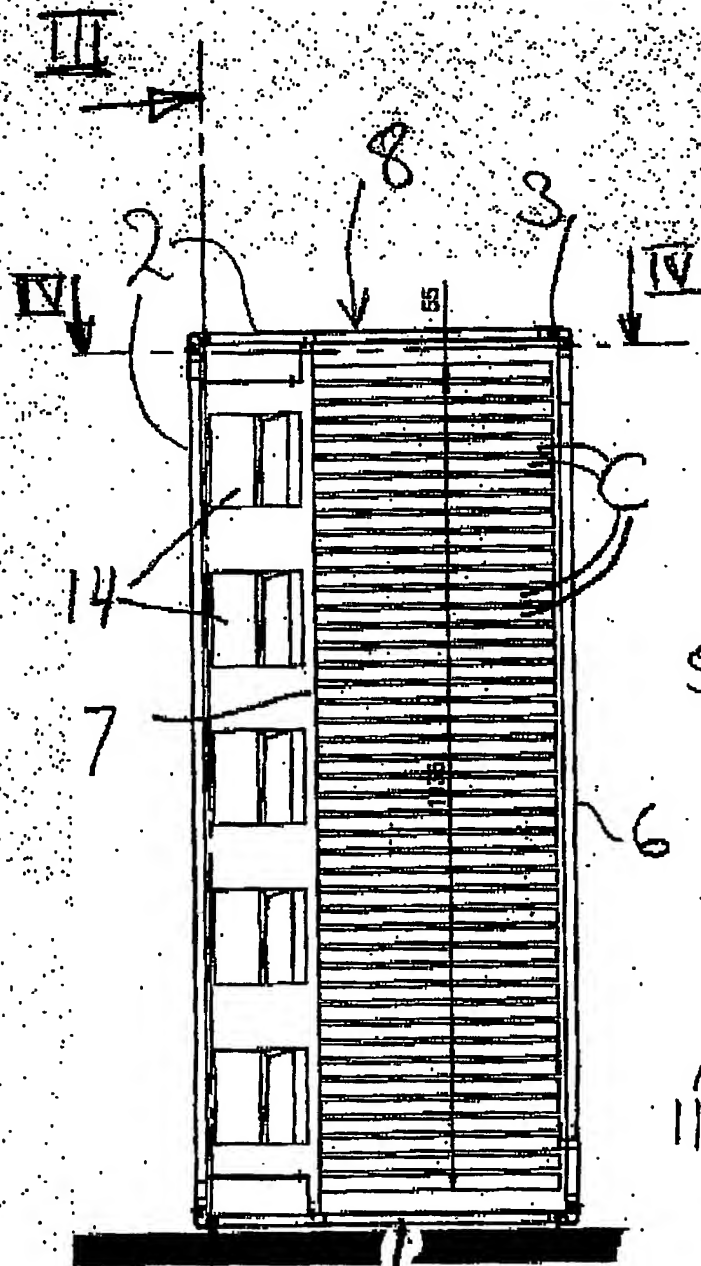


FIGURE 2

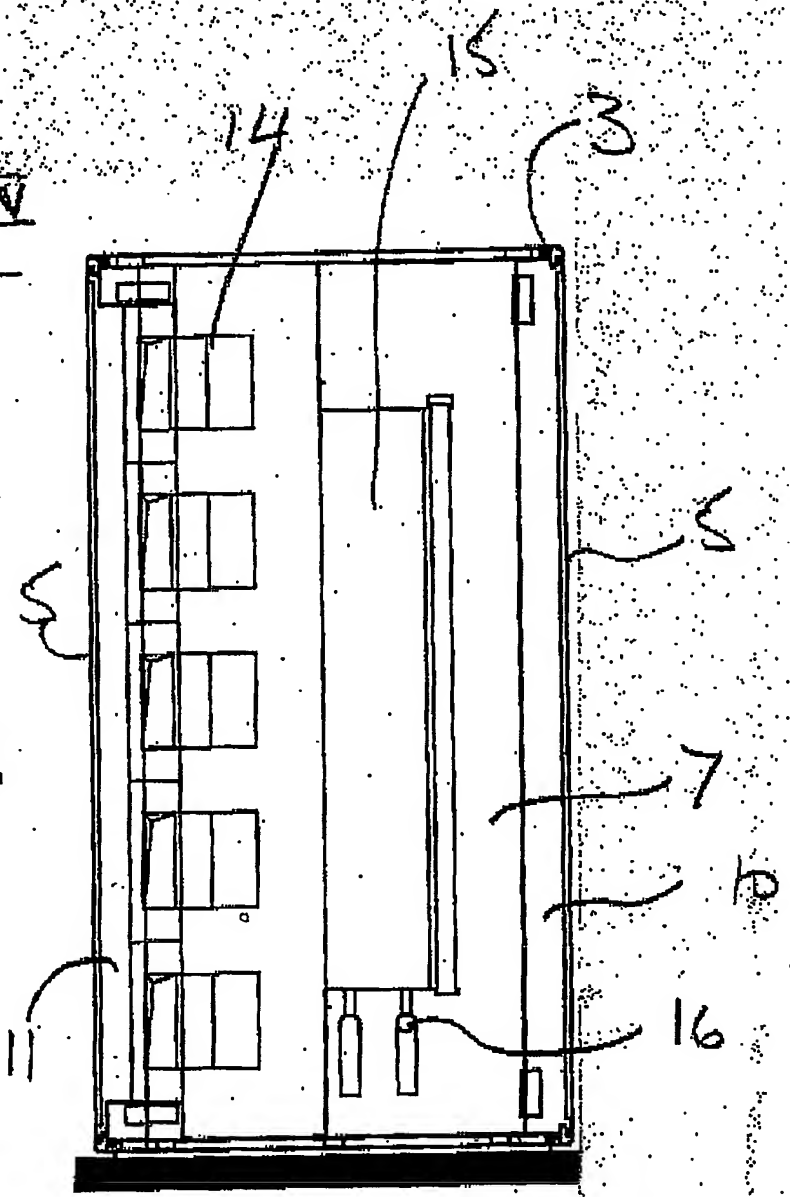


FIGURE 3

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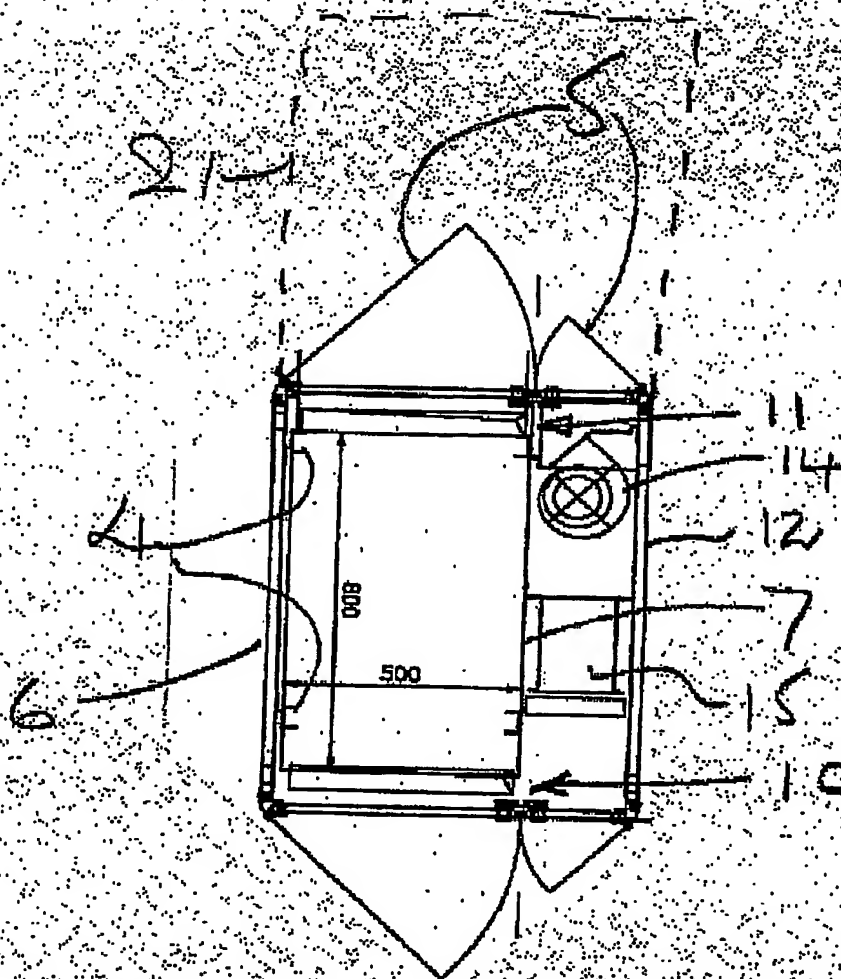


FIGURE 4

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